CONVEYING DEVICE

DESCRIPTION

The invention relates to a conveying device for conveying workpieces through a press line, transfer press, or the like, in accordance with the preamble to claim 1.

PRIOR ART

Where the manufacture of a workpiece calls for a plurality of punch and shaping operations, then for economic production the necessary individual operations can be carried out in a press line, transfer press, or large component transfer press.

As a rule, such systems are provided with conveying device for automatically conveying workpieces. These conveying device either possess their own drives or are confirmed by the press drive. DE 198 01 731 A1 discloses a conveying device with discrete drives. Two stationary drive motors drive a telescoping extension arm arrangement via a traction means arrangement. By controlling the speed of rotation and direction of rotation of the drive motors, the conveying device known as a telescoping feeder performs horizontal and vertical movements. The required conveying path generally comprises overlapping horizontal and vertical movements. Any movement profile can be traveled with this system.

A telescoping feeder has proved itself in practice. However, problems occur in particular during use on large conveying paths. For example, when producing for instance quarter panels for a motor vehicle body, the intervals for the shaping stages can be 6 meters and more.

In this case, a guide system with a broad base and great stiffness is needed for the telescoping feeder. However, since the length of the extension arm is supposed to be as short as possible for preventing edges during conveying and for preventing collisions during the shaping process, this also affects the quality of the guidance.

OBJECT AND ADVANTAGE OF THE INVENTIONS

The object underlying the invention is to further develop the prior art and suggest a guide for the extension arm(s) of a telescoping feeder, which guide assures good quality of guidance.

This object is attained proceeding from a conveying device in accordance with the preamble to claim 1, using the characterizing features of claim 1.

The subordinate claims provide advantageous and useful further embodiments of the telescoping feeder in accordance with claim 1.

The idea underlying the invention is that a longitudinally displaceable extension arm is borne on a fixed traverse member such that during horizontal displacement of said extension arm the guide carriages travel half of the

displacement path. Due to this movement there is thus a type of carrying support or guidance. In order to assure the travel movement of the guide carriage, a corresponding carrying apparatus is provided.

For instance, a rack can be provided on the fixed transverse member and a rack can be provided on the moveable extension arm, which racks are mechanically linked to a toothed wheel attached to the guide carriage. The guide carriage is then forcibly carried along during horizontal displacement.

The desired broad guide base for the telescoping feeder is attained using the horizontal position of each guide carriage.

Rapid accelerations and speeds are necessary for attaining lower conveying times. The dynamic movements are easy to control because the suggested guide system is characterized by great stiffness. Thus only minor vibrations occur when the workpiece is conveyed, which promotes defined placement onto the die, and also the holding forces during conveying are easy to control.

The telescoping feeders are arranged in pairs and in a mirror image of one another in the area of the press upright. Slides that can also travel and that are coupled to a transverse crossmember are located on the movable extension arm. The transverse crossmember is fitted with means conveying the workpiece. The horizontal movement of the extension arm and the slide is

actuated by at least one controllable drive that is mechanically linked to two toothed belt drives.

It is also possible to use two drives in an advantageous manner, this enhancing the functional security of the conveying device, i.e. if one drive fails, the second drive would move the telescoping feeder out of a possible collision area.

A vertical movement is provided as an additional production axis. For this purpose, a drive system for the vertical lift is connected to the horizontally locationally fixed holding device.

Since it is possible to do without an intermediate positioning or orientation station in the suggested conveying direction, the design is structured modularly such that it is possible to integrate additional clearances needed for changing the position of the workpieces. For instance, the workpiece can be pivoted in the conveying direction and counter thereto. For this purpose, the transverse crossmember on the slide is borne rotatable and eccentric, which renders the workpiece pivotable at its center of mass.

It is also possible to have the transverse crossmember and thus the workpiece at an inclined position with no problem, since the vertical axes can be traveled independent of one another. Likewise, double parts can be conveyed with no limitation.

Additional details and advantages of the invention result from the following explanation of an exemplary embodiment that is depicted in the figures.

Figure 1 illustrates a partial view of 2 presses with a telescoping feeder in the workpiece removal position;

Figure 2 is like Figure 1, however the telescoping feeder is in the workpiece placement position;

Figure 3 is a section through a guide carriage in accordance with line A – A in Figure 1.

DESCRIPTION OF THE EXEMPLARY EMBODIMENT

Figure 1 depicts partial views of the shaping areas of the presses 2 and 3 in a simplified depiction of a press line 1. The sliding table 4 and the ram 5 can be seen. The punch and die are not shown in greater detail. The telescoping feeder 8 is attached to the press uprights 6, 7. Fixed, controllable motors 9, 10 effect the drive for the vertical movement and act via pinion gears on racks 11, 12. Linear guides 13, 14 assure certain vertical guidance. Forced synchronization of the lift movement is attained using the connecting shaft 41. For unloading the drives 9, 10, the masses to be moved can be compensated by cylinders 15, 16.

The racks 11, 12 are joined to the transverse crossmember 17 on which are arranged the motors 18, 19 that drive a toothed belt 20. For reasons of

functional security, two motors are suggested 18, 19 so that if one of the motors fails the telescoping feeder can be moved out of a potential collision area using the second motor.

The toothed belt 20 is reversed via two belt pulleys 21, 22 that are rotatably borne on the fixed transverse member 23 and is a attached to a movable extension arm 24. Thus, activating the drives 18, 19 in the rotational direction 25 moves the extension arm 24 horizontally in the direction of the arrow 26. Located on the extension arm 24 is a slide 27 that can likewise travel horizontally and having a transverse crossmember 28 coupled thereto. The transverse crossmember 28 is equipped with workpiece holding means 29. The slide 27 is moved in a known manner via a toothed belt 42 that is held on the fixed transverse member 23 using a clamping connection. The moveable extension arm 24 is guided and supported on the transverse member 23 using guide carriages 30, 31, 32.

Figure 3 depicts the cross-section of the guide carriage 30. The rack 33 is securely joined to the transverse member 23 and the rack 34 is securely joined to the extension arm 24. A toothed wheel 35 is situated between the racks 33 and 34 and is in constant contact with both. Linear guides 36 and 37 are attached to the racks 33 and 34. The guide shoes 38 and 39 of the linear guide are joined to one another by a holding plate 40.

The linear guides 36, 37 are configured such that the guide shoes 38, 39 are also held perpendicular to the direction of movement. If the toothed belt 20 is driven by the motors 18, 11, this also causes the extension arm 24 and the rack 34 to move. The carrying device for the guide carriage functions such that the toothed wheel 35 rolls on the racks 33 and 34, and the guide carriage 30 connected to the toothed wheel 35 moves in the direction of the extension arm 24. The same drive and movement sequence also apply for the guide carriages 31 and 32. As can be seen from Figures 1 and 2, the position of the guide carriage 30 changes with the movement of the extension arm 24 and is parallel thereto, so that support of the extension arm 24 is assured.

The invention is not limited to the described and depicted exemplary embodiment. It also includes all technical embodiments in the framework of applicable claim 1, and thus for instance the carrying movement of the guide carriage can occur using linear gears such as chains or toothed belts. Likewise, linear guidance can be performed in different geometrical configurations such as for instance flat or circular guidance and as sliding or rolling guidance. The inventive step can also be applied for multiple telescoping units without limitation. In this case, guide carriages with carrying apparatus are arranged for each pair of telescoping units.

LEGEND

1	Press line
22	Belt pulley
2	Press
23	Transverse member
3	Press
24	Extension arm
4	Sliding table
25	Arrow for direction of rotation
5	Ram
26	Arrow for longitudinal direction
6	Press upright
27	Slide
7	Press upright
28	Transverse crossmember
8	Telescoping feeder
29	Workpiece holding means
9	Motor
30	Guide carriage
10	Motor
31	Guide carriage

11 Rack

32 Guide carriage

12 Rack

33 Rack

13 Linear guide

34 Rack

14 Linear guide

35 Toothed wheel

15 Cylinder

36 Linear guide

16 Cylinder

37 Linear guide

17 Transverse crossmember

38 Guide shoe

18 Motor

39 Guide shoe

19 Motor

40 Holding plate

20 Toothed belt

41 Connecting shaft

21 Belt pulley

42 Toothed belt